

**AMENDMENTS TO THE CLAIMS**

The following listing of claims will replace all prior versions and listings of claims in the application.

**LISTING OF CLAIMS**

1. (original) An automated tool installation and workspace analysis method comprising:

calculating a center of gravity of a fastener;

determining an axis of the fastener based at least partially on the center of gravity; and

determining positioning of a fastener actuating tool according to the axis of the fastener.

2. (original) The method of claim 1 wherein determining the axis includes determining the axis based on a relationship between an initial axis and vertices of the fastener.

3. (original) The method of claim 1 wherein determining the axis includes:

assuming an initial axis;

rotating the initial axis; and

adjusting the initial axis based on a relationship between the initial axis and vertices of the fastener.

4. (original) The method of claim 3 wherein the assuming includes assuming an initial axis of  $L(c, V)$ , where  $c$  is the center of gravity of the fastener,  $V$  is  $(1, 0, 0)$ , and  $L$  is a line through  $c$  having direction  $V$ .

5. (original) The method of claim 3 wherein the rotating includes rotating the initial axis in at least one direction about at least one axis.

6. (original) The method of claim 4 wherein the relationship is a distance between each vertex and the line  $L(c, V)$ .

7. (original) The method of claim 1 further comprising rotating the tool about the axis to determine a tool-rotation envelope.

8. (original) A graphical user interface that implements the method of claim 1.

9. (original) An automated tool installation and workspace analysis method comprising:

- determining geometry of a fastener in an environment;
- calculating a center of gravity of the fastener; and
- determining an axis of the fastener based at least partially on the geometry of the fastener and the center of gravity.

10. (original) The method of claim 9 wherein determining the geometry includes determining vertices of the fastener.

11. (original) The method of claim 10 wherein determining the axis includes:

assuming an initial axis of the fastener; and

adjusting the initial axis based on a relationship between an initial axis and vertices of the fastener.

12. (original) The method of claim 11 wherein the adjusting includes:

rotating the initial axis in at least one direction;

calculating an updated relationship between the rotated axis and the vertices of the fastener; and

adjusting the initial axis based on the updated relationship.

13. (original) The method of claim 11 wherein the assuming includes assuming an initial axis of  $L(c, V)$ , where  $c$  is the center of gravity of the fastener,  $V$  is a direction  $(1, 0, 0)$ , and  $L$  is a line through  $c$  having direction  $V$ .

14. (original) The method of claim 12 wherein the step of rotating includes rotating the initial axis in at least one direction about at least one of an  $x$  axis, a  $y$  axis, and a  $z$  axis.

15. (original) The method of claim 11 wherein the relationship is a distance between each vertex and the initial axis.

16. (new) An automated tool installation and workspace analysis method comprising:

calculating a center of gravity of a fastener;

determining an axis of the fastener based at least partially on the center of gravity and thereby determining a position for an actuating tool to actuate said fastener as a function of said axis of the fastener;

positioning said actuating tool according to said position and determining rotation of said actuating tool within the workspace; and

evaluating said actuating tool based on said rotation of said actuating tool and said position.

17. (new) The method of claim 16 wherein said actuating tool comprises a wrench that actuates said fastener by rotating so that said fastener fastens to the workspace.